No. XXXVI.

Memoir on the Occultation of Aldebaran by the moon on the 21st of October 1793. By Jose Joaquin de Ferrer.

Read November 16th 1804.

OBSERVATIONS ON THIS OCCULTATION.

		Apparent Time. h ′ ″
In the Capital of Porto-Rico by Don Cosme de Churruca, Captain of a Ship in the Royal Navy.	Immersion.	12 30 33 76
	Emersion.	12 57 55 80
In the Observatory of Ferrol by Don Manuel Herrera, Lieutenant in the Navy.	Im. . .	18 03 40 0
	Em. . .	19 09 59 0
In Figueras by Mr. Mechain.	Im. . .	18 59 27 7
	Em. . .	20 00 17 6
In the Observatory of Gotha.	Im. . .	19 38 09 1
	Em. . .	20 13 20 7
In Paris at the Naval Observatory.	Im. . .	18 53 28 0
	Em. . .	19 45 36 0
In Berlin.	Im. . .	19 46 17 0
In Marseilles.	Im. . .	19 10 04 5
In Dantzick.	Im. . .	20 14 32 0

		h
From these observations results the longitude of Porto-Rico west of Paris according to	Lalande.	4 33 27 0
	Mechain.	4 33 36 2
	Triesnecker.	4 33 58 6

According to the statement of Mr. Lalande in the *Connoissance des Temps* for the year 8, Triesnecker has, contrary to the opinion of this astronomer, diminished the horizontal parallax of the moon given, in the third Edition of his Astronomy, 6″; but this variation cannot produce so great a difference. As the position of Porto-Rico is very interesting to geographers, I have proposed to calculate all the observations, to examine the elements, and point out the dependence to be placed on these results.

I had formerly calculated these observations, supposing the proportion between the polar and equatorial diameters of the earth to be as 229 : 230 conformably to the theory of Newton, and the horizontal parallax in Paris = 57′ 44″ 8. Since that period this proportion has been ascertained to be as 333 : 334. The constant parallax of the equator 57′ 1″, from which the parallax at Paris = 57′ 36″ 8. for the moment of the con-

junction.—It follows then from the first elements that the longitude of Porto-Rico West of Paris = 4^h 33′ 26″ 6, and the difference of latitudes in conjunction 22′ 58″.—It is to be remarked that calculating from the different elements, there resulted an increase in the difference of meridians between Porto-Rico and Paris viz:

	h	′	″
From the difference between 1-230 and 1-334 for the figure of the earth.		+ 08	3
From the differences of parallaxes between 57′ 44″ 8, and 57′ 36″ 8.		+ 17	1
Longitude of Porto-Rico by the first elements	4	33 26	6
Longitude of Porto-Rico West of Paris corrected.	4	33 52	0

These results inclined me, at the moment, to believe that the longitude determined by Triesnecker was nearer the truth than any of the others, I immediately began a careful investigation, making use of the best elements astronomy has as yet afforded.

In consideration of the great influence of the parallax and oblate figure of the earth, upon the longitude of Porto-Rico, we may infer the great importance of repeating this kind of observations, for if we can once with accuracy determine the difference of meridians, we can then determine the proportion of the earth's axes, with more certainty than by the *Geodesical* method; or supposing this proportion known, the lunar parallax could then be determined.

		′	″
The horizontal equatorial parallax agreeably to Mayer.		= 57	11 4
These results are on the supposition of the difference of the axes of the earth being 1-300.	Lalande.	57	05 0
	Burg.	57	01 0
	Laplace.	56	57 3

The parallax which I have adopted is that of Burg, who deduced it from observations of a great number of solar eclipses and occultations of stars.

The inflection of the moon I have deduced from the same observations. It will not be amiss to observe, that comparing the conjunctions deduced from immersions and emersions, or immersions with immersions, they give the difference of meridians, so that the doubt which may exist as to the quantity of inflection, cannot be such as to affect the result. To determine the difference of latitudes at the conjunction, I have made use of the observations at Gotha and Porto-Rico.

						′	″
It is to be remarked that at Porto-Rico the apparent center of the moon passed to the North of Aldebaran supposing 2″ of inflection.					Immer.	13	56 38
					Emer.	15	49 18
At Gotha to the South of Aldebaran.					Immer.	10	55 35
					Emer.	12	20 35
Difference of Latitude at conjunction with 2″ inflection.	Porto-Rico.	= 22′ 55″9		=		22	57 3
	Gotha		22 58 7				
Supposing 1″ of inflection	Porto-Rico.		22 57 0			22	57 5
	Gotha.		22 57 1				

It appears therefore that the center of the moon having passed at such a distance from Aldebaran and in different quarters, the errors proceeding from the semidiameter of the moon, or quantities of inflections, have contrary signs, that is if we suppose 1″ more in the inflection, we diminish the difference of latitudes at conjunction by the observations in Porto-Rico 1″ 1 and augment it by those of Gotha 1″ 6, consequently we determine at the same time both elements, which is reduced to the following question: To find the horizontal semidiameter of the moon at the moment of the conjunction; by applying the corrections of the horary variations and the corresponding increase of altitude, there results the same difference of latitude at conjunction, by the observations at both places. By applying the calculation we find the inflection of the horizontal semidiameter of the moon=1″ 0, and the difference of latitudes 22′ 57″ 0. At Figueras and Ferrol the apparent centers of the

	In its Immersion.	Emersion.
Moon and Aldebaran pass Ferrol.	2′ 1″ 0	3′ 47″
Figueras.	2 28 0	2 47

These observations after having determined the difference of latitudes at conjunction, are the most proper to determine the quantity of inflection.

By applying the calculation to the observations of Ferrol, there results the inflection of the semidiameter of the moon.

	″	
	0	9
Applied to the observations of Figueras. . .	0	5
To those of Porto-Rico and Gotha. . . .	1	0
Mean inflection. . .	0	8

According to Lalande, the inflection increases the semidiameter of the moon 2″; Mr. Du Sejour, after having calculated the observations of Mr Short on the Solar eclipse of 1st April

1764, says that an inflection of 1″ 8 and a diminution of the semidiameter of the moon of 1″ 5 agreed with some of the observations, but he could come to no final conclusion upon this point. To determine the quantity of the inflection it is necessary to know precisely the following data, viz. the precise diameter of the moon, the beginning and end of the occultation, the true difference of latitude, the parallaxes in longitude and latitude, and the horary motions of the two bodies.

Let us suppose the diameter observed to be less than that calculated by the tables 0″ 8, as in the present case, and that in other respects the elements that have been made use of are correct, we cannot on that account suppose it to be the effect of the irradiation, it being certain that the doubt respecting the lunar diameter, measured by different astronomers, is much greater than the above difference.

The diameter of the sun has been frequently the object of the attention of astronomers, and although it is much more easily determined than that of the moon, there is notwithstanding, a great difference in the various determinations.

			′	″
The Apogee diameter of the Sun by,	Picard.	in 1670 =	31	38 0
	Mouton.	——	31	31 0
	Louville.	1724	31	33 0
Gentil, Lemonnier and	La Caille	1750	31	34 5
	Bradley.	——	31	30 5
	Lalande.	1764	31	31 0
	Maskelyne.	——	31	29 0
	Short.	——	31	28 0

If we confine ourselves even to the determination of Lalande, Maskelyne, Bradley, and Short we find a difference from 2″ to 3″ and there is reason to believe that the uncertainty of the diameter of the moon is much greater, consequently we may well doubt whether the diminution of 1″ or 2″ resulting from the observations of the moon by eclipses of the sun and occultations, is the effect of the irradiation or of an error in the diameter represented in tables.

Remark on the elements of the tables.

I have calculated the place of Aldebaran taking the right ascension from the catalogue of Maskelyne and the declination

of Piazzi; and the place of the moon from the theory of Laplace. The horizontal parallax of the moon, from the statements of the tables of Lalande, in the third edition of his astronomy, I have diminished 3″ 1, conformably to the determination of Burg as mentioned above.

I have also taken care to calculate the horary motions corresponding to the intervals between the immersions and emersions, and between the true conjunction and the moments of the immersions and emersions, the variation of the parallax, semidiameter, equation of time and all the other elements, which are subject to variation.

Elements of the

Occultation of Aldebaran by the moon.

October 21st, 1793.

		h	′	″	
Conjunction in Paris by the tables,	Mean time.	17	51	02	3
	Apparent time.	18	06	29	3
Apparent obliquity of the ecliptic.		23°	27	48	0
Apparent longitude of Aldebaran.		66	54	33	4
Southern latitude of Aldebaran.		5	28	49	0
Southern latitude of the moon.		5	05	58	27
Horary motion of the longitude of the moon.			33	50	15
Horary diminution, of the horary motion in longitude.				2	66
Horary motion of the moon in north latitude.				7	79
Horary increase of horary motion in latitude.				1	77
Proportion of the axes of the earth, as 333 : 334			′	″	
Horizontal parallax of the moon at Paris.			57	36	80
Polar horizontal parallax.			57	32	30
Horary variation of the parallax decreasing.				2	30
Horizontal semidiameter of the moon.			15	45	0
Horary diminution of the semidiameter of the moon.				0	63
Latitude of Aldebaran.——Latitude of the moon.			22	50	73
Right ascension of the sun.		207	13	54	0
Horary motion of the right ascension of the sun.			2	23	0
Equation of time.			—15	27	0
Horary augmentation of the equation of time.				0	34
Horary motion of the moon between the immersion and emersion at Paris.			33	46	7
Do. between the immersion and the true conjunction.			33	49	1
Do. between the true conjunction and the emersion.			33	47	9
Horary motion in latitude between Paris.	immersion and emersion.			9	9
	immersion and true conjunction.			8	4
	true conjunction and emersion.			9	3
Horary motion at Porto-Rico between the immersion and emersion.			33	52	2
	immersion and true conjunction.		33	51	5
	true conjunction and emersion.		33	50	8
Horary motion in latitude between Porto-Rico.	immersion and emersion.			6	4
	immersion and true conjunction.			6	9
	true conjunction and emersion.			7	3

Application of the calculation of the observation at Gotha.

Latitude—Vertical angle=50° 47′ 41″ 49. Logarithm of the radius=9,9992171
Radius at the Pole 9,9986978

	Immersion. ° ′ ″	Emersion. ° ′ ″
H=Altitude of the nonagesime	56 34 06	54 01 40
N=Distance of the ☾ from the nonages.	58 23 10	65 06 30
N+Parallax in longitude	59 04 34	65 49 10
L Latitude of the moon by the tables	5 5 50·8	5 05 44 2
Horizontal polar parallax	57 30 24	57 28 70

Sine horizontal polar parallax. . .	8,2234038	8,2232030
Logarithmic radius at Gotha. } Logarithmic radius at the Pole. } . .	0,0005193	0,0005193
Co-arithmetical cosine latitude of the moon.	0,0017209	0,0017200
Sine altitude of the nonagesime. . .	9,9214490	9,9081105
Sine (N + parallax in longitude) . .	9,9334117	9,9601182
P=Sine parallax in long. =41′ 22″ 79	=8,0805047 Sine P.=42′ 39″ 22	8,0936710
Cosine latitude of the moon. . .	9,9982791	9,9982800
Co-ar: sine N.	0,0697644	0,0423423
Constant logarithm.	8,1485482	8,1342933
Cotangent H.	9,8196570	9,8608182
Cosine latitude apparent of the moon 5° 39′50″	9,9978740 5° 41 17	9,9978563
Sine Q=31′ 47″ 71.	7,9660792 Sine Q=33′ 49″ 55	7,9929678
Constant logarithm.	8,1485482	8,1342933
Cosine (N + ½ P.)	9,7152204	9,6183552
Cosine apparent latitude of the moon. .	9,9978740	9,9978563
Tangent the true latitude of the moon. .	8,9505967	8,9504777
Sine Q′=2′ 13″ 86.	6,8122393 Sine Q′. 1′ 43″ 61.	6,7009825

	′	″		′	″
Parallax in latitude=Q+Q′=34	01	57.	Parallax in latitude=Q+Q′=35	33	16
Parallax in longitude 41	22	79.	Parallax in longitude 42	39	22
Difference of apparent latitudes in the interval. . . .			1	25	0
Difference of apparent longitudes do. . . .			21	21	0

Y=mean apparent latitude of the moon + latitude of Aldebaran / 2. } = 5° 34 40

Apparent inclination of the orbit 3° 48′ 51 arc or chord 1277″ 76

Apparent semidiameter—2″ inflection= { I. 15′ 48″ 38 / E. 15 46 33

Angles of conjunction. . . { I. 46° 17′ 18″ / E. 38 31 26

We have the distances of the apparent conjunction. { I.= 11 28 78 / E. 9 52 51

Difference of apparent latitudes. { I.= 10 55 35 / E 12 20 35

True conjunction in apparent time = 18h 40′ 06″ 1

Latitude of the ☽ by the table at the imm.	=5° 5′ 50″ 80 at the em.=	5° 5′ 44″ 20
Parallaxes in latitude. . .	+34 1 57	+35 33 16
(a) Apparent latitude of the ☽ by the tables	5 39 52 37	5 41 17 36
Difference of latitudes observed.	—10 55 35	—12 20 35
Lat. of the ☽ in the region of the star.	5 28 57 02	5 28 57 01
Latitude of Aldebaran.	5 28 49 00	5 28 49 00
Error of the tables	—0 00 08 02	—0 00 08 01

Occultation of Aldebaran by t

Observed in the Capital of Porto-Rico and different plac

	GOTHA.				PARIS MARINE OBSERVATORY				FIGUERAS.				FI
	Immersion.		Emersion.		Immersion.		Emersion.		Immersion.		Emersion.		Immersion
	h ′ ″		h ′ ″		h ′ ″		h ′ ″		h ′ ″		h ′ ″		h ′ ″
Apparent times observed.	19 33 09	1	20 13 20	7	18 53 28	0	19 45 36		18 59 27	7	20 00 17	6	18 03 40
Long. from Paris (national observy.)	— 33 35	5			— 1	8			— 2 29	5			+ 42 13
Apparent times in Paris.	18 59 33	6	19 39 45	2	18 53 26	2	19 45 34	2	18 56 58	2	19 57 48	1	18 45 53
Equation of time.	— 15 27	28	15 27	55	15 27	27	15 27	56	15 27	26	15 27	59	15 27 2
Latitude.——Vertical angle.	50°47 49				48 40 51				42 05 44				43 19 12½
Logarithm of the earth's radius.	9,9992171				9,9992649				9,9994141				9,9993861
The sun's right ascension.	13h 49 04	1	13 49 10	4	13 49 02	5	13 49 11	4	13 49 03	7	13 49 13	2	13 49 02
Moon's longitude by the tables.	67°24 27	80	67 47 05	25	67 21 01	10	67 50 22	0	67 23 00	8	67 57 15	4	67 16 45
Moon's latitude.	5 05 50	80	5 05 44	20	5 05 51	7	5 05 43	1	5 05 50	90	5 05 40	86	5 05 52 5
Moon's polar horizontal parallax.	57 30	30	57 28	70	57 30	4	57 28	3	57 30	4	57 28	0	57 30
Moon's horizontal semidiameter.	15 44	44	15 44	02	15 44	52	15 43	99	15 44	48	15 43	87	15 44 6
Altitude of nonagesime.	56 34 06		54 01 40		60 41 50		57 46 16		66 40 57		62 53 28		68 02 30
Moon's true distance from the nonag.	58 23 11		65 06 30		52 11 20		61 08 18		55 26 32		66 38 35		44 27 48
Parallax in longitude.	41 27	79	42 39	22	40 11	24	43 05	73	44 07	12	47 30	22	37 59 3
Parallax in latitude.	34 01	57	35 33	16	31 02	07	32 49	43	25 33	25	28 02	70	25 05 1
Apparent semidiameter—1″ inflection	15 49	38	15 47	33	15 51	13	15 48	49	15 50	90	15 47	38	15 53 4
Conjunction, apparent time.	18h 40 06	1	18 40 06	1	18 06 38	7	18 06 38	7	18 09 05		18 09 05		17 24 21
True diff. of lat. at conjunction.	22 57	1			23 00	4			22 57	99			22 57
Conjunct. by the immersion's Allowing 22′ 57″ difference of latitude at conjunction and	= 1″ = 18h 40′ 05″ 5 inflect.				18h 06′ 33″ 0				18h 09′ 05″				17h
	= 2″ = 18 40 03 1 inflect.				18 06 30 8				18 09 03				17

		o ′ ″
Latitude of	Gotha.	50 57 46
	Paris marine observatory.	48 51 04
	Figueras.	42 16 00
	Ferrol.	43 29 30
	Porto-Rico.	18 28 45
	Berlin.	52 31 30
	Marseilles.	43 17 49
	Dantzick.	54 21 05

Mean conjunction by the immersion and emersion at Paris.—

Conjunction observed in Gotha—diff. long.=true conjunction in Paris.
Do. do. in Paris— diff. long.= . . do.
Do. do. in Figueras. . . . . do.

Mean conjunction, apparent time in the national observatory of Paris

Difference of latitude at conjunction.	Gotha.	22 57
	Paris.	23 00
	Figueras.	22 57
	Ferrol.	22 57
	Porto-Rico.	22 57
	Mean.	22 58

...on of Aldebaran by the Moon,

...ico and different places of Europe: October 21st, 1793.

...ATORY	FIGUERAS.		FERROL.		PORTO-RICO.		BERLIN.	MARSEILLES.	DANTZICK.
...on.	Immersion.	Emersion.	Immersion.	Emersion.	Immersion.	Emersion.	Immersion.	Immersion.	Immersion.
″	h ′ ″	h ′ ″	h ′ ″	h ′ ″	h ′ ″	h ′ ″	h ′ ″	h ′ ″	h ′ ″
6	18 59 27 7	20 00 17 6	18 03 40	19 09 59	12 30 33 7	12 57 55 8	19 46 17	19 10 04 5	20 14 32
	— 2 29 5		+ 42 13		+4 33 52		— 44 09 0	— 12 08 0	—1 05 15
4 2	18 56 58 2	19 57 48 1	18 45 53	19 52 12	17 04 25 7	17 31 47 8	19 02 08	18 57 56 5	19 09 17 0
7 56	15 27 26	15 27 59	15 27 21	15 27 60	15 26 66	15 26 83	15 27 28	15 27 26	15 27 29
	42 05 44		43 19 12½		18 22 34		52 21 32	43 07 33	54 11 18 6
	9,9994141		9,9993861		9,9998700		9,9991825	9,9993900	9,9991427
1 4	13 49 03 7	13 49 13 2	13 49 02 2	13 49 11 2	13 48 46 2	13 48 50 2	13 49 04 5	13 49 04 0	13 49 05 6
2 0	67 23 00 8	67 57 15 4	67 16 45 2	67 54 05 5	66 19 32 0	66 34 58 8	67 25 59 0	67 23 33 7	67 29 53 5
3 1	5 05 50 90	5 05 40 86	5 05 52 50	5 05 41 70	5 06 05 47	5 06 2 54	5 05 50 15	5 05 58 87	5 05 49 24
8 3	57 30 4	57 28 0	57 30 7	57 28 6	57 34 6	57 33 6	57 30 13	57 30 53	57 29 9
3 99	15 44 48	15 43 87	15 44 60	15 43 92	15 45 66	15 45 35	15 44 41	15 44 48	15 44 28
6	66 40 57	62 53 28	68 02 30	64 55 30	85 47 41	37 49 52	54 20 20	65 06 50	50 54 20
8	55 26 32	66 38 35	44 27 48	56 34 10	27 40 49	21 44 48	59 55 35	57 08 05	63 42 35
5 73	44 07 12	47 30 22	37 59 35	44 02 96	27 15 41	21 47 60	40 54 73	44 25 60	40 26 33
9 43	25 33 25	28 02 70	25 05 16	27 01 65	8 52 32	7 02 44	35 41 62	26 49 62	38 03 93
8 49	15 50 90	15 47 38	15 53 41	15 50 03	15 58 56	15 59 66	15 48 82	15 50 59	15 47 59
8 7	18 09 05	18 09 05	17 24 21 4	17 24 21 4	13 32 41 8	13 32 41 8			
	22 57 99		22 57 7		22 57				
	18h 09′ 05″		17h 24′ 21″ 4		13h 32′ 41″ 3		18h 50 42 5	18h 18 41 2	19h 11 47
	18 09 03		17 24 19 4		13 32 37 7		18 50 39 4	18 18 39 4	19 11 41 1

...junction by the immersion and emersion at Paris.—

	h ′ ″
...l in Gotha—diff. long.=true conjunction in Paris.=	18 06 30 6
... in Paris— diff. long.= . . do.	18 06 36 9
... in Figueras. . . . . do.	18 06 35 5
...pparent time in the national observatory of Paris	18 06 34 3

...e of latitude at conjunction.

Gotha.	22 57 10
Paris.	23 00 40
Figueras.	22 57 99
Ferrol.	22 57 70
Porto-Rico.	22 57 00
Mean.	22 58 0

Conjunction by the immersion's allowing 22′ 57″ difference of latitude at conjunction and inflection. = 1″ inflection 2″

	h ′ ″	h ′ ″
By the immersion of Gotha. .	18 06 30 0	18 06 27 6
do. Paris. .	18 06 31 3	18 06 29
do. Figueras. .	18 06 35 5	18 06 33 5
do. Berlin. .	18 06 33 5	18 06 30 4
do. Marseilles. .	18 06 33 2	18 06 31 4
do. Dantzick. .	18 06 32 0	18 06 26 1
Mean conjunction in apparent time =	18 06 32 5	18 06 29 7
By observations of Gotha and Porto-Rico. =	22′ 57″ 0	

Difference of latitudes at the conjunction.			22′	50″ 73
Error of tables.	+		8	01
Difference of latitudes at conjunction.			22	58 74

Supposing the inflection = 1″ the difference of latitudes at the conjunction would have been 22′ 57″ 1.

Supposing 22′ 57″ for difference of latitude at the conjunction, we have an error in the tables in latitude = ... — 6″ 27

Apparent latitude by the tables. (a p. 218)	5	39	52 37
Apparent latitude corrected.	5	39	46 10
Aldebaran.	5	28	49 00
Difference of apparent latitude at the immersion. . . .		10	57 10

With 22′ 57″ difference of latitude at conjunction there results 10′ 57″ 10 for difference of apparent latitude at the immersion, and supposing

2″ of inflection we have true conjunction.	18h	40′	03″	1
1″ of inflection do. do	18	40	05	5

Note. The altitudes and longitudes of the nonagesime have been calculated with the latitude diminished by the vertical angle corresponding to 333 : 334, for the proportion of the axes: I have omitted the forms which I made use of, and have only given the calculation of the parallaxes to shew the method I have used, which is the same with that of Cagnoli.—See his treatise of trigonometry, printed in Paris, page 411—427.

Determination of the difference of latitudes at the conjunction.

It will appear by the annexed table of the occultation, as observed in the capital of Porto-Rico and different places in Europe, that the mean difference of latitudes at conjunction, (supposing 1″ of inflection) is 22′ 58″ 00.

The emersion at Paris was observed rather late, as appears by a comparison of the observations, and consequently cannot be much confided in; the observations at Figueras and Ferrol are not the most proper in order to determine the latitudes at conjunction, because the center of the moon passed near to the star, we shall therefore confine ourselves to those of Gotha and Porto-Rico, which give 22′ 57″ 0 without risk of an error of 1″.

If we diminish the horizontal polar parallax of the ☾ by 4″ according to the theory of Laplace, there would have resulted a difference of latitudes at conjunction by the observations at Porto-Rico and Gotha = 22′ 56″.

Determination of the longitude of Porto-Rico west of Paris.

Conjunctions at Paris resulting from three suppositions.

1. By the immersions and emersions at Paris, Gotha and Figueras, reduced to the national observatory.
2. Supposing 22′ 57″ difference of latitude at the conjunction, and making use of the immersions with 1″ of inflection.
3. Making use of the same difference of latitude at the conjunction with 2″ inflection.

Conjunction at Paris by observations.

	h ′ ″	h ′ ″	h ′ ″
At Gotha.	18 06 30 6	18 06 30 0	18 06 27 6
Paris.	18 06 36 9	18 06 31 3	18 06 29 0
Figueras.	18 06 35 5	18 06 35 5	18 06 33 3
Berlin.		18 06 33 5	18 06 30 4
Marseilles.		18 06 33 2	18 06 31 4
Dantzick.		18 06 32 0	18 06 26 1
Conjunction on three hypotheses.	18 06 34 3	18 06 32 5	18 06 29 7
Same at Porto-Rico.	13 32 41 8	13 32 41 3	13 32 37 7
Longitude of Porto-Rico on the three hypotheses.	4 33 52 5	4 33 51 2	4 33 52 0

	h ′ ″
Mean longitude of Porto-Rico.	4 33 51 9

Supposing 22′ 57″ difference of latitudes at conjunction and 1″ of inflection we have the longitude of Paris by the immersions.

Conjunction at the national observatory, apparent time, by the mean of the observations at Paris, Gotha, Figueras, Berlin, Marseilles and Dantzick. = 18h 06′ 32″ 5

	h ′ ″
Gotha east of Paris.	33 33 0
Figueras.	2 32 5
Ferrol west.	42 11 0
Berlin east.	44 10 0
Marseilles.	12 08 7
Dantzick.	1 05 14 5
Porto-Rico west.	4 33 51 2

If we suppose the proportion of the difference of the earth axes 1-300, it diminishes the difference of meridians between Porto-Rico and Paris. . . . . = — 2″ 65

1″ diminution of the parallax, ... + 2 14

1″ more in the horary motion of longitude. + 3 70

If we suppose the polar horizontal parallax diminished 4″, conformably to Laplace's theory, it would increase the longitude of Porto-Rico by 8″ 5 of time: in this case the longitude of Porto-Rico would be $(=4^h\ 33'\ 51''\ 2+8''\ 5)=4^h\ 33'\ 59''\ 7$

According to Triesnecker. 4 33 58 6

The variations in the elements, have no sensible influence on the difference of meridians between the observations in Europe.—So that we may consider the above results to have as much accuracy as the observations can possibly be susceptible of.

No. XXXVII.

The geographical position of sundry places in North America and in the West Indies, calculated from astronomical observations: By Jose Joaquin de Ferrer.

Read at sundry times, 1805.

OCCULTATION OF JUPITER BY THE MOON.

January 15th, 1799.

Observations.		Apparent time: h ′ ″
At New-Orleans by Mr. Andrew Ellicott.	Immersion of the center of Jupiter.	5 45 46 5
	Emersion of the center.	7 06 20 0
At the royal observatory of the Island of Leon by Don Julian Ortiz Canelas.	Immersion of the 1st limb.	13 29 43 8
At the national observatory at Paris by Mr. Mechain.	Immersion of the center.	13 50 12 5

Elements by the tables at 13h 00′ 00″ mean time or 12h 49′ 50″ 1 apparent time at Paris.

		o ′ ″
Moon's	Longitude reckoned from the apparent equinox.	46 26 38
	Latitude. S.	34 26 7
	Equatorial horizontal parallax.	55 04 0
	Horizontal diameter—3″ inflection.	20 00 0
	Horary motion in longitude.	30 27 7
	Horary motion in latitude northerly.	2 41 1
	Horary augmentation of parallax.	1 4

		o ′ ″
Jupiter's	Geocentric longitude.	46 24 46
	Geocentric latitude.	57 16
	Horary motion in longitude direct.	2 40
	Horizontal parallax.	1 87
	Semidiameter.	20 33

Proportion of the equatorial and polar diameters of the earth 334 : 333.